Sub B3 cont'd.

portion of the field of view with the number k, and performing summation on all portions on the field of view preceding the portion with number I+1; calculating a differential non uniformity of the test object in accordance with the expressions DNU(I,J)=± {P(I)-P'(J)} and I=J±, wherein DNU(I,J) is a differential non uniformity of the pitch of test object on the portion between the pitch with a number I and the pitch with the number J; P(I) is an average pitch with the number I in the first, initial one dimensional profile; P'(J) is an average pitch with the number J on the second, shifted one dimensional profile, with selection of a plus sign when the displacement was performed along the displacement of the probe and the minus sign where the displacement was performed in an opposite direction; and calculation of an integrated non uniformity of the test object in accordance with the formula

$$\mathbf{P(I+1) - P(1) + \sum_{k=1}^{I} DNU(k),}$$

where is a corrected, true value of the pitch with number I=1; P(1)- is a base value of the pitch with number 1; and performing assumation on all pitches preceding the pitch with the number I+1.

2. A method as defined in claim 1; and further comprising performing the steps of scanning of the test object and another scanning of the

test object many times, and averaging of results of the other measurements before calculation of the differential nonlinearity of scan.

3. A method as defined in claim 1, wherein the line by line measurement of the pitch values and the conversion includes discrimination of signal in accordance with the preliminarily determined threshold and forming signal islands, determining a position of each island as an X coordinate of a center of mass of each island, and calculating a pitch at a distance between the centers of mass of neighboring islands.

4. A method as defined in claim 3; and further comprising selecting the threshold within the range of 0.3-0.6 of a signal amplitude.

Sub A2 Cont

5. A method of determination of true nonlinearity of scan along the selected direction X or Y in scan microscope, comprising the steps of orienting the test object on a microscope stage so that a direction of strips of pitch

Sub B2 cont.

field of view of the microscope; calculating an integrated nonlinearity of the line scan in accordance with the formula

$$\mathbf{INL(X} = \sum \delta\mathbf{X)} = \sum_{k=1}^{l} \mathbf{DNL(K),}$$

wherein $INL(X=\Sigma\ \delta X)$ is an integrated nonlinearity of scan on the portion with X coordinate equal to a sum of all performed displacements $X = \Sigma\ \delta X$, and summing in accordance with a number of displacement of the test object in the field of view of the microscope.

6. A method as defined in claim 5; and further comprising performing the steps of scanning and another scanning many times, an averaging of the results before the averaging steps.

7. A method as defined in claim 5; and further comprising using as the test object a figure which contains an image of at least two strips.

8. A method as defined in claim 5, wherein the line by line measurements include a discrimination of the signal in accordance with a preliminarily established threshold and forming of signal islands, determining of a position of each island as an X coordinate of the center of mass of each island, and calculating a pitch as a distance between the centers of mass of neighboring islands.

9. A method as defined in claim 8, wherein a threshold of signals is in the range of 0.3-0.6 of a signal amplitude.

10. A method as defined in claim 5, wherein the test object as a figure which contains an image of not less than two dimensional object, said orienting of the test objects on the microscope stage being selected so that a line connecting centers of mass of neighboring islands is parallel to the direction X and Y, depending on whether a nonlinearity along the axis X or Y is to be determined.

11. A method as defined in claim 5, wherein the test object is figure which contains an image of at least two pairs of two dimensional objects, and a line which connects centers of mass of neighboring islands forms a straight angle, while orientation of the test object on the microscope stage is selected so that one of the connecting lines is parallel to a scan direction along the axis X and another one is parallel to a scan direction along an axis Y.

CLAIMS

1. A method of determination of true nonlinearity of scan along a selected direction X or Y in scan microscope, comprising the steps of orienting a test object on a microscope space so that a direction of strips of periodic pressure is perpendicular to a scanning line; scanning of the test object along the axis X and Y for forming a first two dimensional array of signal value; line by line measuring of pitch values between two strips of a diffraction grating and conversion of a first two dimensional array of signal values into a first two dimensional array of pitch values; averaging of the pitch values along all lines of a frame along a direction perpendicular to the scanning line and converting of the first two dimensional of array of pitch values into a first one dimensional profile of dependence of the average pitch from a coordinate along the scanning line; displacement of the test object along the scanning line by a value of one pitch along or opposite to a probe movement; another scanning of the test object along the axis X and Y for forming a second, displaced array of signal values; line by line measuring of pitch values between two neighboring strips of the grating and converting of the second two dimensional array of signal values into a second two dimensional array of pitch values; averaging of the pitch values along all lines of the frame along a direction perpendicular to the scanning line and converting the second two dimensional array of pitch values into a second

Sub B2

one dimensional profile of dependence of the average pitch of the coordinate along the scanning line;

calculating of a differential nonlinearity of scan along the selected scanning direction in accordance with the expression

$$DNL(I+1,I) = \pm\{P(I)-P(I)\}$$

wherein DNL (I+1,I) is a differential nonlinearity of scan on a portion of a field of view with number I+1 relative to the portion with number I; P'(I) is an average pitch with number I measured in accordance with the second, shifted one dimensional profile P(I) is an average value of the same pitch with I measured in accordance with the first, initial one dimensional profile, with selecting a plus sign if a displacement was performed along the scanning line and minus sign if the test object was displaced opposite to the movement of the probe along the scanning line, with I from 1 to N wherein N is a number of fixed pitches along the line of scanning; calculated an integrated nonlinearity along a whole field of view in accordance with the formula

$$\mathbf{INL(I+1)} = \sum_{k=1}^{I} \mathbf{DNU(K)},$$

wherein INL(I+1) is an integral nonlinearity of scan on the portion of the field of view with number I+1; DNL(k) is a differential nonlinearity on the

structure is perpendicular to a scanning line, scanning of the test object along the axis X and Y for forming a first two dimensional array of signal values; line by line measuring of pitch value between two selected neighboring strips of a grating and conversion of a first two dimensional array of signal values into a first one dimensional array of line by line pitch values between selected strips; averaging of pitch values along all lines of a one dimensional array by calculating a first average value of the pitch between the selected pair of strips; displacing of the test object on the microscope stage in direction of displacement of a probe or in an opposite direction by a fixed distance; another scanning of the test object along the axis X and Y for forming a second two dimensional array of signal values; line by line measuring of pitch values between same two selected neighboring strips of the grating and converting of a second two dimensional array of signal values into a second one dimensional array of line by line pitch values between the selected strips; averaging of pitch values along all lines of one dimensional array by calculating a second average value of a pitch between the selected pair of strips; calculating of differential nonlinearity of line scan on a portion of a field of view between two positions of the selected pair of strips according to the equation

$$\mathbf{DNL(X + \delta X, X) = P' - P}$$

another multiple displacement of the test object and repeated scanning of the test object for forming the second two dimensional array of signal values, with displacement of image of the selected pair of lines along all